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Umekawa et al.

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(54) **OPHTHALMOLOGIC APPARATUS AND ALIGNMENT METHOD**

(56) **References Cited**

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U.S. PATENT DOCUMENTS
5,120,123 A * 6/1992 Akiyama A61B 3/1225
351/205
5,537,163 A 7/1996 Ueno
(Continued)

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FOREIGN PATENT DOCUMENTS

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CN 1471893 A 2/2004
CN 1868397 A 11/2006
(Continued)

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OTHER PUBLICATIONS

Chinese Office Action issued in corresponding application 201310325640.5 dated Dec. 15, 2014.
(Continued)

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(57) **ABSTRACT**

(30) **Foreign Application Priority Data**

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Provided is an ophthalmologic apparatus capable of executing accurate automatic alignment even for an eye having an intraocular lens (IOL) implanted therein. The ophthalmologic apparatus includes: an optical system including a light beam projecting unit for projecting a light beam to an eye to be inspected, and a light receiving unit for receiving a reflection light beam from the eye to be inspected; a detecting unit for detecting a plurality of bright spot images from the reflection light beam received by the light receiving unit; and a calculating unit for calculating an alignment status between the eye to be inspected and the optical system based on the detected plurality of bright spot images. The ophthalmologic apparatus is further provided with a selection unit for selecting bright spot images to be used for the calculation by the calculating unit, from among the plurality of bright spot images.

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(52) **U.S. Cl.**

CPC **A61B 3/152** (2013.01); **A61B 3/103** (2013.01); **A61B 3/14** (2013.01)

(58) **Field of Classification Search**

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